



BILLING CODE 3510-22-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

RIN 0648-XD512

Takes of Marine Mammals Incidental to Specified Activities; Low-Energy Marine Geophysical Survey in the Ross Sea, January to February 2015

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice; issuance of an Incidental Harassment Authorization (IHA).

SUMMARY: In accordance with the Marine Mammal Protection Act (MMPA), notification is hereby given that NMFS has issued an IHA to the National Science Foundation (NSF) Division of Polar Programs, and Antarctic Support Contract (ASC) on behalf of Louisiana State University, to take marine mammals, by Level B harassment, incidental to conducting a low-energy marine geophysical (seismic) survey in the Ross Sea, January to February 2015.

DATES: Effective January 24 to April 9, 2015.

ADDRESSES: A copy of the IHA and the application are available by writing Jolie Harrison, Chief, Permits and Conservation Division, Office of Protected Resources, National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910 or by telephone to the contacts listed below (see FOR FURTHER INFORMATION CONTACT).

An electronic copy of the IHA application containing a list of the references used in this document may be obtained by writing to the address specified above, telephoning the contact listed here (see FOR FURTHER INFORMATION CONTACT) or visiting the Internet at: <http://www.nmfs.noaa.gov/pr/permits/incidental/>. Documents cited in this notice, including the

IHA application, may also be viewed by appointment, during regular business hours, at the aforementioned address.

NSF and ASC prepared an “Initial Environmental Evaluation/Environmental Assessment to Perform Marine Geophysical Survey, Collect Bathymetric Measurements, and Conduct Coring by the RVIB Nathaniel B. Palmer in the Ross Sea” (IEE/EA) in accordance with the National Environmental Policy Act (NEPA) and the regulations published by the Council of Environmental Quality (CEQ). It is posted at the foregoing site. NMFS has independently evaluated the IEE/EA and has prepared a separate NEPA analysis titled “Environmental Assessment on the Issuance of an Incidental Harassment Authorization to the National Science Foundation and Antarctic Support Contract to Take Marine Mammals by Harassment Incidental to a Low-Energy Marine Geophysical Survey in the Ross Sea, January to April 2015.” NMFS also issued a Biological Opinion under section 7 of the Endangered Species Act (ESA) to evaluate the effects of the low-energy seismic survey and IHA on marine species listed as threatened or endangered. The NMFS Biological Opinion is available online at:

<http://www.nmfs.noaa.gov/pr/consultations/opinion.htm>.

FOR FURTHER INFORMATION CONTACT: Howard Goldstein or Jolie Harrison, Office of Protected Resources, NMFS, 301-427-8401.

SUPPLEMENTARY INFORMATION:

Background

Sections 101(a)(5)(A) and (D) of the MMPA, (16 U.S.C. 1361 et seq.) direct the Secretary of Commerce (Secretary) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by United States citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings

are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review.

An authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses (where relevant), and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such takings are set forth. NMFS has defined "negligible impact" in 50 CFR 216.103 as "...an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival."

Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].

Summary of Request

On July 15, 2014, NMFS received an application from NSF and ASC requesting that NMFS issue an IHA for the take, by Level B harassment only, of small numbers of marine mammals incidental to conducting a low-energy marine seismic survey in International Waters (i.e., high seas) in the Ross Sea during January to February 2015. The IHA application includes an addendum which includes incidental take requests for marine mammals related to icebreaking activities.

The research will be conducted by one research institution, the Louisiana State University (Baton Rouge). NSF and ASC plan to use one source vessel, the RVIB Nathaniel B. Palmer (Palmer), and a seismic airgun array and hydrophone streamer to collect seismic data in the Ross Sea. The vessel will be operated by ASC, which operates the United States Antarctic Program (USAP) under contract with NSF. In support of the USAP, NSF and ASC plan to use conventional low-energy, seismic methodology to perform marine-based studies in the Ross Sea, including evaluation of the timing and duration of two grounding events (i.e., advances of grounded ice) to the outer and middle shelf of the Whales Deep Basin, a West Antarctic Ice Sheet paleo ice stream trough in the eastern Ross Sea (see Figures 1 and 2 of the IHA application). The studies will involve a low-energy seismic survey, acquiring core samples from the seafloor, and performing radiocarbon dating of benthic foraminifera to meet a number of research goals. In addition to the planned operations of the seismic airgun array and hydrophone streamer(s), NSF and ASC intend to operate a single-beam echosounder, multi-beam echosounder, acoustic Doppler current profiler (ADCP), and sub-bottom profiler continuously throughout the survey. NMFS published a notice making preliminary determinations and proposing to issue an IHA on November 17, 2014 (79 FR 68512). The notice initiated a 30-day public comment period.

Acoustic stimuli (i.e., increased underwater sound) generated during the operation of the seismic airgun array and from icebreaking activities may have the potential to cause behavioral disturbance for marine mammals in the survey area. This is the principal means of marine mammal taking associated with these activities, and NSF and ASC have requested an authorization to take 18 species of marine mammals by Level B harassment. Take is not expected to result from the use of the single-beam echosounder, multi-beam echosounder,

ADCP, and sub-bottom profiler, as the brief exposure of marine mammals to one pulse, or small numbers of signals, to be generated by these instruments in this particular case as well as their characteristics (e.g., narrow-shaped, downward-directed beam emitted from the bottom of the ship) is not likely to result in the harassment of marine mammals. Also, NMFS does not expect take to result from collision with the source vessel because it is a single vessel moving at a relatively slow, constant cruise speed of 5 knots ([kts]; 9.3 kilometers per hour [km/hr]; 5.8 miles per hour [mph]) during seismic acquisition within the survey, for a relatively short period of time (approximately 27 operational days). It is likely that any marine mammal will be able to avoid the vessel.

Description of the Specified Activity

Overview

NSF and ASC plan to use one source vessel, the Palmer, a two GI airgun array and one hydrophone streamer to conduct the conventional seismic survey as part of the NSF-funded research project “Timing and Duration of LGM and post-LGM Grounding Events in the Whales Deep Paleo Ice Streams, Eastern Ross Sea Continental Shelf.” In addition to the airguns, NSF and ASC intend to conduct a bathymetric survey and core sampling from the Palmer during the low-energy seismic survey.

Dates and Duration

The Palmer is expected to depart from McMurdo Station on approximately January 24, 2015 and arrive at Hobart, Australia on approximately March 20, 2015. Research operations will be conducted over a span of 27 days (from approximately January 24 to February 26, 2015). At the end of the proposed research operations, the Palmer will resume other operational activities, and transit to Hobart, Australia. The total distance the Palmer will travel in the region to conduct

the research activities (i.e., seismic survey, bathymetric survey, transit to coring locations and McMurdo Station) represents approximately 12,000 km (6,479.5 nmi). Some minor deviation from this schedule is possible, depending on logistics and weather (e.g., the cruise may depart earlier or be extended due to poor weather; or there could be additional days of airgun operations if collected data are deemed to be of substandard quality).

Specified Geographic Region

The planned project and survey sites are located in selected regions of the Ross Sea (located north of the Ross Ice Shelf) and focus on the Whales Deep Basin trough (encompassing the region between 76 to 78° South, and between 165 to 170° West) (see Figure 2 of the IHA application). The low-energy seismic survey will be conducted in International Waters. Figure 2 of the IHA application illustrates the general bathymetry of the proposed study area near the Ross Ice Shelf and the previously collected data with respect to seismic units and dated cores. Water depths in the survey area are between 100 to 1,000 m. The low-energy seismic survey will be within an area of approximately 3,882 km² (1,131.8 nmi²). This estimate is based on the maximum number of kilometers for the low-energy seismic survey (1,750 km) multiplied by the area ensonified around the planned tracklines (1.109 km x 2). The ensonified area is based on the predicted rms radii (m) based on modeling and empirical measurements (assuming 100% use of the two 105 in³ GI airguns in 100 to 1,000 m water depths), which was calculated to be 1,109 m (3,638.5 ft) (see Appendix B of the IHA application).

If icebreaking is required during the course of the research activities in the Antarctica region, it is expected to occur on a limited basis. The research activities and associated contingencies are designed to avoid areas of heavy sea ice condition, and the Ross Sea region is typically clear during the January to February time period due to a large polynya which routinely

forms in front of the Ross Ice Shelf.

Researchers will work to minimize time spent breaking ice. The planned science operations are more difficult to conduct in icy conditions because the ice noise degrades the quality of the geophysical and ADCP data. Also, time spent breaking ice takes away from time supporting research. Logistically, if the vessel is in heavy ice conditions, researchers will not tow the airgun array and streamer, as this will likely damage equipment and generate noise interference. It is possible that the low-energy seismic survey can be performed in low ice conditions if the Palmer could generate an open path behind the vessel.

Because the Palmer is not rated to routinely break multi-year ice, operations will generally avoid transiting through older ice (i.e., 2 years or older, thicker than 1 m). If sea ice is encountered during the cruise, it is anticipated the Palmer will proceed primarily through one year sea ice, and possibly some new, very thin ice, and will follow leads wherever possible. Satellite imagery from the Ross Sea region (<http://www.iup.physik.uni-bremen.de:8084/ssmis/>) documents that sea ice is at its minimum extent during the month of February.

Based on the proposed tracklines, estimated transit to the proposed study area from McMurdo Station, and expected ice conditions (using historical sea ice extent), it is estimated that the Palmer may need to break ice along a distance of approximately 500 km (269.9 nmi) or less. Based on the ship's speed of 5 knots under moderate ice conditions, 500 km represents approximately 54 hours of icebreaking operations. It is noted that typical transit through areas of primarily open water containing brash or pancake ice are not considered icebreaking for the purposes of this assessment.

Detailed Description of the Specified Activity

NSF and ASC plan to conduct a low-energy seismic survey in the Ross Sea from January

to February 2015. In addition to the low-energy seismic survey, scientific research activities will include conducting a bathymetric profile survey of the seafloor using transducer-based instruments such as a multi-beam echosounder and sub-bottom profiler; acquiring bottom imaging, using underwater camera systems; and collecting approximately 32 core samples from the seafloor using various methods and equipment. Water depths in the survey area are 100 to 1,000 meters (m) (328.1 to 3,280.1 feet [ft]). The low-energy seismic survey is scheduled to occur for a total of approximately 200 hours over the course of the entire cruise, which will be for approximately 27 operational days in January to February 2015. The planned research activities will bisect approximately 25,500 km² (7,434.6 nmi²) in the Ross Sea region (see Figure 2 of the IHA application). The low-energy seismic survey will be conducted during the day (from nautical twilight-dawn to nautical twilight-dusk) and night, and for up to 100 hours of continuous operations at a time. Note that there will be 24-hour or near 24-hour daylight in the study area between January 24 and February 26, 2015

(<http://www.timeanddate.com/sun/antarctica/mcmurdo?month=2&year=2015>). The operation hours and survey length will include equipment testing, ramp-up, line changes, and repeat coverage. Some minor deviation from these dates will be possible, depending on logistics and weather. The Principal Investigator is Dr. Philip Bart of the Louisiana State University (Baton Rouge).

Grounding events in the Whales Deep Basin are represented by seismically resolvable Grounding Zone Wedges. During the planned activities in the Ross Sea, researchers will acquire additional seismic data and multi-beam bathymetry and imaging to precisely define the depositional and erosional limits of the outer and middle shelf Grounding Zone Wedges. The collection of benthic samples and resulting analyses will test the hypothesis and counter

hypothesis regarding the West Antarctic Ice Sheet retreat as it relates to the Whales Deep Basin paleo ice stream through: (1) radiocarbon dating in situ benthic foraminifera isolated from diamict deposited on the Grounding Zone Wedges foreset; (2) ramped pyrolysis of acid insoluble organic isolated from diatom ooze overlying Grounding Zone Wedges diamict; (3) calculating the duration of the two grounding events; and (4) extracting pore-water from the Grounding Zone Wedges diamict to determine salinity and $\delta^{18}\text{O}$ values to test a numerical model prediction regarding the West Antarctic Ice Sheet retreat.

The procedures to be used for the survey will be similar to those used during previous low-energy seismic surveys by NSF and will use conventional seismic methodology. The planned low-energy seismic survey will involve one source vessel, the Palmer. NSF and ASC will deploy a two Sercel Generator Injector (GI) airgun array (each with a discharge volume of 105 in^3 [$1,720 \text{ cm}^3$], in one string, with a total volume of 210 in^3 [$3,441.3 \text{ cm}^3$]) as an energy source, at a tow depth of up to 3 to 4 m (9.8 to 13.1 ft) below the surface (more information on the airguns can be found in Appendix B of the IHA application). A third airgun will serve as a “hot spare” to be used as a back-up in the event that one of the two operating airguns malfunctions. The airguns in the array will be spaced approximately 3 m (9.8 ft) apart and 15 to 40 m (49.2 to 131.2 ft) astern of the vessel. The receiving system will consist of one or two 100 m (328.1 ft) long, 24-channel, solid-state hydrophone streamer(s) towed behind the vessel. Data acquisition is planned along a series of predetermined lines, all of which will be in water depths 100 to 1,000 m. As the GI airguns are towed along the survey lines, the hydrophone streamer(s) will receive the returning acoustic signals and transfer the data to the onboard processing system. All planned seismic data acquisition activities will be conducted by technicians provided by NSF and ASC, with onboard assistance by the scientists who have planned the study. The vessel will

be self-contained, and the crew will live aboard the vessel for the entire cruise.

The weather, sea, and ice conditions will be closely monitored, including the presence of pack ice that could hinder operation of the airgun array and streamer(s) as well as conditions that could limit visibility. If situations are encountered which pose a risk to the equipment, impede data collection, or require the vessel to stop forward progress, the equipment will be shut-down and retrieved until conditions improve. In general, the airgun array and streamer(s) can be retrieved in less than 30 minutes.

The planned seismic survey (including equipment testing, start-up, line changes, repeat coverage of any areas, and equipment recovery) will consist of approximately 1,750 kilometers (km) (944.9 nautical miles [nmi]) of transect lines (including turns) in the study area in the Ross Sea (see Figures 1 and 2 of the IHA application). In addition to the operation of the airgun array, a single-beam and multi-beam echosounder, ADCP, and a sub-bottom profiler will also likely be operated from the Palmer continuously throughout the cruise. There will be additional airgun operations associated with equipment testing, ramp-up, and possible line changes or repeat coverage of any areas where initial data quality is sub-standard. In NSF and ASC's estimated take calculations, 25% has been added for those additional operations. The portion of the cruise planned for after the low-energy seismic survey in the Ross Sea is not associated with the project; it is associated with McMurdo Station support and will occur regardless of the low-energy seismic survey (i.e., no science activities will be conducted). In addition, the Palmer will transit approximately 3,980 km (2,149 nmi) to Australia after the planned support activities for McMurdo Station.

Table 1. Planned low-energy seismic survey activities in the Ross Sea.

| Survey Length (km) | Total Duration (hr) ¹ | Airgun Array Total Volume | Time Between Airgun Shots (Distance) | Streamer Length (m) |
|--------------------|----------------------------------|---------------------------|--------------------------------------|---------------------|
|--------------------|----------------------------------|---------------------------|--------------------------------------|---------------------|

| | | | | |
|----------------------|------|---|---|-------------------|
| 1,750 (944.9 nmi) | ~200 | 2 x 10 ⁵ in ³ (2 x 1,720 cm ³) | 5 to 10 seconds (12.5 to 25 m or 41 to 82 ft) | 100 (328.1 ft) |
|----------------------|------|---|---|-------------------|

¹ Airgun operations are planned for no more than 100 continuous hours at a time.

NMFS outlined the purpose of the program in a previous notice of the proposed IHA (79 FR 68512, November 17, 2014). The activities to be conducted have not changed between the proposed IHA notice and this final notice announcing the issuance of the IHA. For a more detailed description of the authorized action, including vessel and acoustic source specifications, metrics, characteristics of airgun pulses, predicted sound levels of airguns, bathymetric survey, core sampling, icebreaking activities, etc., the reader should refer to the notice of the proposed IHA (79 FR 68512, November 17, 2014), the IHA application, IEE/EA, EA, and associated documents referenced above this section.

Comments and Responses

A notice of preliminary determinations and proposed IHA for NSF and ASC's low-energy seismic survey was published in the Federal Register on November 17, 2014 (79 FR 68512). During the 30-day public comment period, NMFS received comments from one private citizen and the Marine Mammal Commission (Commission). The comments are posted online at: <http://www.nmfs.noaa.gov/pr/permits/incidental/>. Following are the substantive comments and NMFS's responses:

Comment 1: The Commission recommends that NMFS adjust density estimates used to estimate the numbers of potential takes by incorporating some measure of uncertainty when available density data originate from other geographical areas and temporal scales and that it formulate a policy or other guidance setting forth a consistent approach for how applicants should incorporate uncertainty in density estimates.

Response: The availability of representative density information for marine mammal

species varies widely across space and time. Depending on survey locations and modeling efforts, it may be necessary to consult estimates that are from a different area or season, that are at a non-ideal spatial scale, or that are several years out of date. As the Commission notes in their letter to NMFS, we continue to evaluate available density information and are continuing progress on guidance that would outline a consistent general approach for addressing uncertainty in specific situations where certain types of data are or are not available.

Comment 2: The Commission recommends that NMFS follow a consistent approach in assessing the potential for taking by Level B harassment from exposure to specific types of sound sources (e.g., echosounders, sub-bottom profilers, side-scan sonar, and fish-finding sonar) by all applicants who propose to use them.

Response: NMFS acknowledges the Commission's recommendation and note that we continue to work on a consistent approach for addressing potential impacts from active acoustic sources. For this low-energy seismic survey, NMFS assessed the potential for single-beam and multi-beam echosounder, ADCP, and sub-bottom profiler operations to impact marine mammals with the concurrent operation of the airgun array. We assume that, during simultaneous operations of the airgun array and the other active acoustic sources, a marine mammal close enough to be affected by the other active acoustic sources would already be affected by the airguns. Take is not expected to result from the use of the single-beam echosounder, multi-beam echosounder, ADCP, and sub-bottom profiler, as the brief exposure of marine mammals to one pulse, or small number of signals, to be generated by these instruments in this particular case as well as their characteristics (e.g., narrow-shaped, downward-directed beam emitted from the bottom of the ship) is less likely to result in the harassment of marine mammals. Accordingly, NMFS will not require a separate assessment of Level B harassment takes for those sources for

this low-energy seismic survey, and NMFS has not authorized take from these other sound sources.

Comment 3: The Commission recommends that NMFS develop a clear policy setting forth more explicit criteria and/or thresholds for making small numbers and negligible impact determinations.

Response: NMFS is required to authorize the take of “small numbers” of a species or stock if the taking (in this case by harassment) will have a negligible impact on the affected species or stocks and will not have an unmitigable impact on the availability of such species or stocks for taking for subsistence purposes. See 16 U.S.C. 1371(a)(5)(D). In determining whether to authorize “small numbers” of a species or stock, NMFS determines whether the numbers of marine mammals “taken” will be small relative to the estimated population size. Table 5 of this notice reflects that the estimated take for the entire survey area represents small numbers of marine mammals relative to the relevant populations. Modeling results, estimated take numbers, and other analysis do not take into account the implementation of mitigation measures, which will likely further lower the numbers of animals taken. NMFS discusses the rationale for our negligible impact finding in the Analysis and Determinations section.

Comment 4: The Commission is concerned that the L-DEO acoustic modeling used is not based on the best available science and does not support its continued use. Therefore, the Commission recommends that NMFS require NSF and ASC to have L-DEO re-estimate the proposed exclusion and buffer zones and associated takes of marine mammals using site-specific environmental (including sound speed profiles, bathymetry, and sediment characteristics at a minimum) and operational (including number/type of airguns, tow depth) parameters for the proposed IHA. The reflective/refractive arrivals are the very measurements that ultimately

determine underwater sound propagation and should be accounted for in site-specific modeling. Either empirical measurements from the particular survey site or a model that accounts for the conditions in the proposed survey area should be used to estimate exclusion and buffer zones because L-DEO failed to verify the applicability of its model to conditions outside of the Gulf of Mexico. The Commission recommends that NMFS impose the same requirements for all future IHAs submitted by NSF, ASC, L-DEO, USGS, SIO, or any other relevant entity.

Response: At present, L-DEO cannot adjust its modeling methodology to add the environmental and site-specific parameters as requested by the Commission. NMFS is working with L-DEO, NSF, ASC, USGS, SIO, and any other relevant entity to explore ways to better consider site-specific information to inform the take estimates and development of mitigation measures for future seismic surveys with L-DEO and NSF. Also, NSF has been exploring different approaches in collaboration with L-DEO and other academic institutions. NMFS will review and consider the final results from L-DEO's publications (Crone et al., 2013, 2014), in which the results of a calibration off the coast of Washington have been reported, and how they reflect on L-DEO's model.

For this seismic survey, L-DEO developed exclusion and buffer zones based on the conservative deep-water calibration results from Diebold et al. (2010). L-DEO's current modeling approach represents the best available information to reach NMFS's determinations for the IHA. The comparisons of L-DEO's model results and the field data collected in the Gulf of Mexico illustrate a degree of conservativeness built into L-DEO's model in deep water.

NMFS acknowledges the Commission's concerns about L-DEO's current modeling approach for estimating exclusion and buffer zones and also acknowledge that L-DEO did not incorporate site-specific sound speed profiles, bathymetry, and sediment characteristics of the

research area within the current approach to estimate those zones for this IHA. However, as described below, empirical data collected at two different sites and compared against model predictions indicate that other facets of the model (besides the site-specific factors cited above) do result in a conservative estimate of exposures in the cases tested.

The NSF and ASC IHA application and IEE/EA describe the approach to establishing mitigation exclusion and buffer zones. In summary, L-DEO acquired field measurements for several array configurations at shallow- and deep-water depths during acoustic verification studies conducted in the northern Gulf of Mexico in 2003 (Tolstoy *et al.*, 2004) and in 2007 and 2008 (Tolstoy *et al.*, 2009). Based on the empirical data from the studies, L-DEO developed a sound propagation modeling approach that conservatively predicts received sound levels as a function of distance from a particular airgun array configuration in deep water. In 2010, L-DEO assessed the accuracy of their modeling approach by comparing the sound levels of the field measurements in the Gulf of Mexico study to its model predictions (Diebold *et al.*, 2010). L-DEO reported that the observed sound levels from the field measurements fell almost entirely below the predicted mitigation radii curve for deep water (Diebold *et al.*, 2010). Based on this information, L-DEO has shown that its model can reliably estimate the mitigation radii in deep water and this represents the best available information to reach the determinations for the subject IHA.

NMFS considered reflected and refracted arrivals in reviewing L-DEO's model results and field data collected in the Gulf of Mexico and Washington illustrate a degree of conservativeness built into their model for deep water. Given that L-DEO demonstrated that the model is conservative in deep water, NMFS concludes that the L-DEO model is an effective means to aid in determining potential impacts to marine mammals from the planned seismic

survey and estimating take numbers, as well as establishing buffer and exclusion zones for mitigation.

During a March 2013 meeting, L-DEO discussed its model with the Commission, NMFS, and NSF. L-DEO compared the Gulf of Mexico (GOM) calibration measurements (Tolstoy et al., 2004; Tolstoy et al., 2009; Diebold et al., 2010) comparison with L-DEO model results. L-DEO showed that at the calibration sites the model overestimated the size of the exclusion zones and, therefore, is likely precautionary in most cases. Based on the best available information that the current model overestimates mitigation zones, we did not require L-DEO to re-estimate the proposed buffer and exclusion zones and associated number of marine mammal takes using operational and site-specific environmental parameters for this IHA.

However, we continue to work with the NSF, ASC, L-DEO, and other related entities on verifying the accuracy of their model. L-DEO is currently analyzing whether received levels can be measured in real-time using the ship's hydrophone streamer to estimate the sound field around the ship and determine actual distances to the buffer and exclusion zones. Crone et al. (2013 and 2014) are analyzing Marcus G. Langseth streamer data collected in 2012 off the Washington coast shelf and slope to measure received levels in situ up to 8 km (4.3 nmi) away from the ship. While results confirm the role that bathymetry plays in propagation, it also confirmed that empirical measurements from the Gulf of Mexico survey used to inform buffer and exclusion zones in shallow water and model results adapted for intermediate water depths also over-estimated the size of the zones for the Washington survey. Preliminary results were presented in a poster session at the American Geophysical Union fall meeting in December 2013 (Crone et al., 2013; available at: <http://berna.ldeo.columbia.edu/agu2013/agu2013.pdf>) and a peer-reviewed journal publication was published in 2014. NMFS will review and consider the final

results and how they reflect on the L-DEO model.

L-DEO has conveyed to NMFS that additional modeling efforts to refine the process and conduct comparative analysis may be possible with the availability of research funds and other resources. Obtaining research funds is typically through a competitive process, including those conducted by federal agencies. The use of models for calculating buffer and exclusion zone radii and developing take estimates is not a requirement of the MMPA Incidental Take Authorization (ITA) process. Furthermore, NMFS does not provide specific guidance on model parameters nor prescribe a specific model for applicants as part of the MMPA ITA process. There is a level of variability not only with parameters in models, but the uncertainty associated with data used in models, and therefore the quality of the model results submitted by applicants. NMFS, however, takes all of this variability into consideration when evaluating applications. Applicants use models as a tool to evaluate potential impacts, to estimate the number of takes of marine mammals, and for mitigation purposes. NMFS takes into consideration the model used and its results in determining the potential impacts to marine mammals; however, it is just a component of NMFS's analysis during the MMPA consultation process, as NMFS also takes into consideration other factors associated with the proposed action, such as geographic location, duration of activities, context, intensity, etc. NMFS considers takes generated by modeling as estimates, not absolutes, and they are factored into NMFS's analysis accordingly. Of broader note, NMFS is currently pursuing methods that include site-specific components to allow us to better cross-check isopleth and propagation predictions submitted by applicants. Using this information, NMFS could potentially recommend modifications to take estimates and/or mitigation zones, as appropriate.

Comment 5: The Commission states that NMFS has incorrectly characterized the

Commission's past comments as advocating that monitoring conducted by an authorized entity always be sufficient to quantify "the exact number of takes" that occurred during the action. While that may be ideal, the Commission recognizes that it cannot be achieved regularly in practice. The Commission believes that NMFS should design monitoring and reporting requirements that provide considerably more than rough, qualitative information. The specified monitoring and reporting requirements need to be sufficient to provide reasonably accurate information on the numbers of marine mammals being taken and the manner in which they are taken, not merely better information on the qualitative nature of the impacts.

Also, the Commission recommends that NMFS consult with NSF, ASC, and other relevant entities (e.g., L-DEO, USGS, SIO) to develop, validate, and implement a monitoring program that provides a scientifically sound, reasonably accurate assessment of the types of marine mammal takes and reliable estimates of the numbers of marine mammals taken by incorporating applicable $g(0)$ and $f(0)$ values. NMFS recently stated that it does not generally believe that post-activity take estimates using $f(0)$ and $g(0)$ are required to meet the monitoring requirement of the MMPA in the context of the NSF and L-DEO monitoring plan. However, NMFS did agree that developing and incorporating a way to better interpret the results of their monitoring (perhaps a simplified or generalized version of $g(0)$ and $f(0)$) is a good idea. NMFS further stated that it would consult with the Commission and NMFS scientists prior to finalizing the recommendations.

Response: As described in this notice, NMFS believes that the model (used to estimate take), which incorporates animal density, estimated sound propagation of the source, and predicted total area ensonified makes a reasonably accurate prediction of the number of animals likely taken (with the acknowledgement that it does not consider the degree to which animals

might avoid the loud source, which likely results in somewhat of an overestimate). Post survey, comparing the actual total area ensonified relative to the predicted area should result in an even more accurate evaluation of exposed animals, which can then be compared to the numbers of animals actually detected to get some sense of how the estimates compare to real likely exposure. Generally for past NSF-funded seismic surveys, the number of detected marine mammals is a small percentage of the predicted exposures. This is expected because marine mammals spend a large portion of their time underwater and they are not expected to always be seen, but the detections allow us to do a broad check to ensure that estimates are not grossly off-base, and to potentially make changes in action or future estimates if appropriate.

In order to make the most accurate estimate of marine mammals based on visual detections, marine mammal scientists use systematic methods (on dedicated marine mammal surveys) to consider both the percentage of time a species spends at the surface ($g(0)$), as well as the likelihood of seeing it when it is there ($f(0)$), which is based on environmental conditions, observer capabilities, animal characteristics (behavior at surface, group size, blow size, etc.) distance of animal from the observer, and other factors. Using all of these factors, combined with a well-planned randomized sampling design, a correction factor may be developed to estimate the number of undetected animals based on the detected animals. The Commission suggests that NMFS require something similar of NSF. Collecting all of the necessary information to inform the development of such a correction factor (which may include biological information about less known species in addition to environmental and detection-based information) to apply to NSF observer detections while also operating the vessel in the manner necessary to achieve the primary goal of NSF's survey would be impractical. More importantly, one of the key factors in developing this type of correction factor is ensuring that the sampling

design doesn't unevenly represent some factor that actually affects the density of the surveyed animal. In this scenario, the germane observations are made while the airguns are on, which clearly effects the density of the animals. While we do know the direction in which the airgun operation likely affects density of marine mammals in the vicinity of the source (lowering it), we know very little else and responses and density in the vicinity to airguns would vary across species and context (environmental, operational, animal behavioral state, etc.) in a manner that we do not have the information to quantify, rendering any such correction factor developed using information collected during airgun operation inaccurate.

That said, as the Commission notes, there may be some value in trying to develop some sort of general correction factor for species that suggests a minimal correction factor that can be justified using, perhaps, existing information on availability of species for detection at the surface (if available) or generalized existing information about sightability at different distances to help estimate likely exposures post-survey. However, given the information laid out above, combined with the patchy distribution of marine mammals and their likely overlay with the relatively narrow strip of water ensonified by the NSF survey, caution would be warranted in how any resulting post-survey exposure estimates using such a correction factor were applied. NMFS is open to considering any specific recommendations that the Commission may have regarding generalized correction factors based on existing information and will discuss with the Commission prior to making any recommendations of this nature to applicants. However, we believe that requiring NSF to collect information in the field to support the development of survey-specific correction factors is not appropriate.

Comment 6: One private citizen opposed the issuance of an IHA by NMFS and the conduct of the low-energy seismic survey in the Ross Sea by NSF and ASC. The commenter stated that NMFS should protect marine life from harm.

Response: As described in detail in the notice of the proposed IHA (79 FR 68512, November 17, 2014), as well as in this document, NMFS does not believe NSF and ASC's low-energy seismic survey would cause injury, serious injury, or mortality to marine mammals, and no take by injury, serious injury, or mortality is authorized. The required monitoring and mitigation measures that NSF and ASC will implement during the low-energy seismic survey will further reduce the potential impacts on marine mammals to the lowest level practicable. NMFS anticipates only behavioral disturbance to occur during the conduct of the low-energy seismic survey.

Description of the Marine Mammals in the Specified Geographic Area of the Specified Activity

Various international and national Antarctic research programs (e.g., Antarctic Pack Ice Seals Program, Commission for the Conservation of Antarctic Marine Living Resources, Japanese Whale Research Program under Special Permit in the Antarctic, and NMFS National Marine Mammal Laboratory), academic institutions (e.g., University of Canterbury, Tokai University, Virginia Institute of Marine Sciences, University of Genova), and other organizations (e.g., National Institute of Water and Atmospheric Research Ltd., Institute of Cetacean Research, Nippon Kaiyo Co., Ltd., H.T. Harvey & Associates, Center for Whale Research) have conducted scientific cruises and/or examined data on marine mammal sightings along the coast of Antarctica, Southern Ocean, and Ross Sea, and these data were considered in evaluating potential marine mammals in the planned action area. Records from the International Whaling Commission's International Decade of Cetacean Research (IDCR), Southern Ocean

Collaboration Program (SOC), and Southern Ocean Whale and Ecosystem Research (IWC-SOWER) circumpolar cruises were also considered.

The marine mammals that generally occur in the planned action area belong to three taxonomic groups: mysticetes (baleen whales), odontocetes (toothed whales), and pinnipeds (seals and sea lions). The marine mammal species that could potentially occur within the Southern Ocean in proximity to the action area in the Ross Sea include 20 species of cetaceans and 7 species of pinnipeds.

The Ross Sea and surrounding Southern Ocean is a feeding ground for a variety of marine mammals. In general, many of the species present in the sub-Antarctic study area may be present or migrating through the Southern Ocean in the Ross Sea during the planned low-energy seismic survey. Many of the species that may be potentially present in the study area seasonally migrate to higher latitudes near Antarctica. In general, most large whale species (except for the killer whale) migrate north in the middle of the austral winter and return to Antarctica in the early austral summer.

The five species of pinnipeds that are found in the Southern Ocean and will most likely be present in the planned study area include the crabeater (Lebodon carcinophagus), leopard (Hydrurga leptonyx), Ross (Ommatophoca rossii), Weddell (Leptonychotes weddellii), and southern elephant (Mirounga leonina) seal. Many of these pinniped species breed on either the pack ice or subantarctic islands. Crabeater seals are more common in the northern regions of the Ross Sea, concentrated in the pack ice over the Antarctic Slope Front. Leopard seals are often seen during the austral summer off the Adelie penguin (Pygoscelis adeliae) rookeries of Ross Island. Ross seals are often found in pack ice and open waters, they seem to prefer dense consolidated pack ice rather than the open pack ice that is frequented by crabeater seals. The

Weddell seal is considered to be common and frequently encountered in the Ross Sea. Southern elephant seals may enter the Ross Sea in the austral summer from breeding and feeding grounds further to the north. They are considered uncommon in the Ross Sea. The southern elephant seal and Antarctic fur seal have haul-outs and rookeries that are located on subantarctic islands and prefer beaches. Antarctic (Arctocephalus gazella) and Subantarctic (Arctocephalus tropicalis) fur seals preferred habitat is not in the proposed study area, and thus it is not considered further in this document.

Marine mammal species likely to be encountered in the planned study area that are listed as endangered under the U.S. Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 et seq.), includes the southern right (Eubalaena australis), humpback (Megaptera novaeangliae), sei (Balaenoptera borealis), fin (Balaenoptera physalus), blue (Balaenoptera musculus), and sperm (Physeter macrocephalus) whale.

In addition to the 13 species known to occur in the Ross Sea, there are 7 cetacean species with ranges that are known to potentially occur in the waters of the proposed study area: southern right, Cuvier's beaked (Ziphius cavirostris), Gray's beaked (Mesoplodon grayi), Hector's beaked (Mesoplodon hectori), and spade-toothed beaked (Mesoplodon traversii) whale, southern right whale dolphin (Lissodelphis peronii), and spectacled porpoise (Phocoena dioptrica). However, these species have not been sighted and are not expected to occur where the planned activities will take place. These species are not considered further in this document. Table 4 (below) presents information on the habitat, occurrence, distribution, abundance, population, and conservation status of the species of marine mammals that may occur in the planned study area during January to February 2015.

Table 2. The habitat, occurrence, range, regional abundance, and conservation status of marine mammals that may occur in or near the low-energy seismic survey area in the Ross Sea (See text and Tables 6 and 7 in NSF and ASC's IHA application for further details).

| Species | Habitat | Occurrence | Range | Population Estimate | ESA ¹ | MMPA ² |
|---|--------------------------------------|------------|---|---|------------------|-------------------|
| Mysticetes | | | | | | |
| Southern right whale (<u>Eubalaena australis</u>) | Coastal, pelagic | Rare | Circumpolar 20 to 55° South | 8,000 ³ to 15,000 ⁴ | EN | D |
| Humpback whale (<u>Megaptera novaeangliae</u>) | Pelagic, nearshore waters, and banks | Common | Cosmopolitan | 35,000 to 40,000 ³ - Worldwide 9,484 ⁵ – Scotia Sea and Antarctica Peninsula | EN | D |
| Minke whale (<u>Balaenoptera acutorostrata</u> including dwarf sub-species) | Pelagic and coastal | Common | Circumpolar – Southern Hemisphere to 65° South | NA | NL | NC |
| Antarctic minke whale (<u>Balaenoptera bonaerensis</u>) | Pelagic, ice floes | Common | 7° South to ice edge (usually 20 to 65° South) | Several 100,000 ³ - Worldwide 18,125 ⁵ - Scotia Sea and Antarctica Peninsula | NL | NC |
| Sei whale (<u>Balaenoptera borealis</u>) | Primarily offshore, pelagic | Uncommon | Migratory, Feeding Concentration 40 to 50° South | 80,000 ³ – Worldwide | EN | D |
| Fin whale (<u>Balaenoptera physalus</u>) | Continental slope, pelagic | Common | Cosmopolitan, Migratory | 140,000 ³ - Worldwide 4,672 ⁵ - Scotia Sea and Antarctica Peninsula | EN | D |
| Blue whale (<u>Balaenoptera musculus</u> ; including pygmy blue whale [<u>Balaenoptera musculus breviceuda</u>]) | Pelagic, shelf, coastal | Uncommon | Migratory Pygmy blue whale – North of Antarctic Convergence 55° South | 8,000 to 9,000 ³ - Worldwide 1,700 ⁶ - Southern Ocean | EN | D |
| Odontocetes | | | | | | |
| Sperm whale (<u>Physeter macrocephalus</u>) | Pelagic, deep sea | Common | Cosmopolitan, Migratory | 360,000 ³ – Worldwide 9,500 ³ – Antarctic | EN | D |
| Arnoux's beaked whale | Pelagic | Common | Circumpolar in Southern | NA | NL | NC |

| | | | | | | |
|--|--|--------|--|---|----|----|
| (<u>Berardius</u> <u>arnuxii</u>) | | | Hemisphere, 24 to 78° South | | | |
| Cuvier's beaked whale (<u>Ziphius</u> <u>cavirostris</u>) | Pelagic | Rare | Cosmopolitan | NA | NL | NC |
| Southern bottlenose whale (<u>Hyperoodon</u> <u>planifrons</u>) | Pelagic | Common | Circumpolar - 30° South to ice edge | 500,000 ³ – South of Antarctic Convergence | NL | NC |
| Gray's beaked whale (<u>Mesoplodon</u> <u>grayi</u>) | Pelagic | Rare | 30° South to Antarctic waters | NA | NL | NC |
| Hector's beaked whale (<u>Mesoplodon</u> <u>hectori</u>) | Pelagic | Rare | Circumpolar - cool temperate waters of Southern Hemisphere | NA | NL | NC |
| Spade-toothed beaked whale (<u>Mesoplodon</u> <u>traversii</u>) | Pelagic | Rare | Circumantarctic | NA | NL | NC |
| Strap-toothed beaked whale (<u>Mesoplodon</u> <u>layardii</u>) | Pelagic | Common | 30° South to Antarctic Convergence | NA | NL | NC |
| Killer whale (<u>Orcinus orca</u>) | Pelagic, shelf, coastal, pack ice | Common | Cosmopolitan | 80,000 ³ – South of Antarctic Convergence 25,000 ⁷ - Southern Ocean | NL | NC |
| Long-finned pilot whale (<u>Globicephala</u> <u>melas</u>) | Pelagic, shelf, coastal | Common | Circumpolar - 19 to 68° South in Southern Hemisphere | 200,000 ^{3,8} – South of Antarctic Convergence | NL | NC |
| Southern right whale dolphin (<u>Lissodelphis</u> <u>peronii</u>) | Pelagic | Rare | 12 to 65° South | NA | NL | NC |
| Hourglass dolphin (<u>Lagenorhynchus</u> <u>cruciger</u>) | Pelagic, ice edge | Common | 33° South to pack ice | 144,000 ³ – South of Antarctic Convergence | NL | NC |
| Spectacled porpoise (<u>Phocoena</u> <u>dioptrica</u>) | Coastal, pelagic | Rare | Circumpolar – Southern Hemisphere | NA | NL | NC |
| Pinnipeds | | | | | | |
| Crabeater seal (<u>Lobodon</u> <u>carcinophaga</u>) | Coastal, pack ice | Common | Circumpolar - Antarctic | 5,000,000 to 15,000,000 ^{3,9} - Worldwide | NL | NC |
| Leopard seal | Pack ice, | Common | Sub-Antarctic | 220,000 to | NL | NC |

| | | | | | | |
|---|---|----------|---|---|----|----|
| (<u>Hydrurga leptonyx</u>) | sub-Antarctic islands | | islands to pack ice | 440,000 ^{3,10} – Worldwide | | |
| Ross seal (<u>Ommatophoca rossii</u>) | Pack ice, smooth ice floes, pelagic | Common | Circumpolar - Antarctic | 130,000 ³ 20,000 to 220,000 ¹⁴ – Worldwide | NL | NC |
| Weddell seal (<u>Leptonychotes weddellii</u>) | Fast ice, pack ice, sub-Antarctic islands | Common | Circumpolar – Southern Hemisphere | 500,000 to 1,000,000 ^{3,11} – Worldwide | NL | NC |
| Southern elephant seal (<u>Mirounga leonina</u>) | Coastal, pelagic, sub-Antarctic waters | Uncommon | Circumpolar - Antarctic Convergence to pack ice | 640,000 ¹² to 650,000 ³ - Worldwide 470,000 – South Georgia Island ¹⁴ | NL | NC |
| Antarctic fur seal (<u>Arctocephalus gazella</u>) | Shelf, rocky habitats | Rare | Sub-Antarctic islands to pack ice edge | 1,600,000 ¹³ to 3,000,000 ³ - Worldwide | NL | NC |
| Subantarctic fur seal (<u>Arctocephalus tropicalis</u>) | Shelf, rocky habitats | Rare | Subtropical front to sub-Antarctic islands and Antarctica | Greater than 310,000 ³ - Worldwide | NL | NC |

NA = Not available or not assessed.

¹ U.S. Endangered Species Act: EN = Endangered, T = Threatened, DL = Delisted, NL = Not listed.

² U.S. Marine Mammal Protection Act: D = Depleted, S = Strategic, NC = Not Classified.

³ Jefferson et al., 2008.

⁴ Kenney, 2009.

⁵ Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) survey area (Reilly et al., 2004)

⁶ Sears and Perrin, 2009.

⁷ Ford, 2009.

⁸ Olson, 2009.

⁹ Bengston, 2009.

¹⁰ Rogers, 2009.

¹¹ Thomas and Terhune, 2009.

¹² Hindell and Perrin, 2009.

¹³ Arnould, 2009.

¹⁴ Academic Press, 2009.

Refer to sections 3 and 4 of NSF and ASC's IHA application for detailed information regarding the abundance and distribution, population status, and life history and behavior of these other marine mammal species and their occurrence in the planned action area. The IHA application also presents how NSF and ASC calculated the estimated densities for the marine mammals in the proposed study area. NMFS has reviewed these data and determined them to be the best available scientific information for the purposes of the IHA.

Potential Effects of the Specified Activity on Marine Mammals

This section includes a summary and discussion of the ways that the types of stressors associated with the specified activity (e.g., seismic airgun operation, vessel movement, gear deployment, and icebreaking) have been observed to impact marine mammals. This discussion may also include reactions that we consider to rise to the level of a take and those that we do not consider to rise to the level of take (for example, with acoustics, we may include a discussion of studies that showed animals not reacting at all to sound or exhibiting barely measureable avoidance). This section is intended as a background of potential effects and does not consider either the specific manner in which this activity will be carried out or the mitigation that will be implemented, and how either of those will shape the anticipated impacts from this specific activity. The "Estimated Take by Incidental Harassment" section later in this document will include a quantitative analysis of the number of individuals that are expected to be taken by this activity. The "Negligible Impact Analysis" section will include the analysis of how this specific activity will impact marine mammals and will consider the content of this section, the "Estimated Take by Incidental Harassment" section, the "Mitigation" section, and the "Anticipated Effects on Marine Mammal Habitat" section to draw conclusions regarding the likely impacts of this activity on the reproductive success or survivorship of individuals and from

that on the affected marine mammal populations or stocks.

When considering the influence of various kinds of sound on the marine environment, it is necessary to understand that different kinds of marine life are sensitive to different frequencies of sound. Based on available behavioral data, audiograms have been derived using auditory evoked potentials, anatomical modeling, and other data, Southall et al. (2007) designate “functional hearing groups” for marine mammals and estimate the lower and upper frequencies of functional hearing of the groups. The functional groups and the associated frequencies are indicated below (though animals are less sensitive to sounds at the outer edge of their functional range and most sensitive to sounds of frequencies within a smaller range somewhere in the middle of their functional hearing range):

- Low-frequency cetaceans (13 species of mysticetes): functional hearing is estimated to occur between approximately 7 Hz and 30 kHz;
- Mid-frequency cetaceans (32 species of dolphins, six species of larger toothed whales, and 19 species of beaked and bottlenose whales): functional hearing is estimated to occur between approximately 150 Hz and 160 kHz;
- High-frequency cetaceans (eight species of true porpoises, six species of river dolphins, Kogia spp., the franciscana [Pontoporia blainvillei], and four species of cephalorhynchids): functional hearing is estimated to occur between approximately 200 Hz and 180 kHz; and
- Phocid pinnipeds in water: functional hearing is estimated to occur between approximately 75 Hz and 100 kHz;
- Otariid pinnipeds in water: functional hearing is estimated to occur between approximately 100 Hz and 40 kHz.

As mentioned previously in this document, 18 marine mammal species (13 cetacean and 5 pinniped species) are likely to occur in the low-energy seismic survey area. Of the 13 cetacean species likely to occur in NSF and ASC's action area, 6 are classified as low-frequency cetaceans (humpback, minke, Antarctic minke, sei, fin, and blue whale), and 7 are classified as mid-frequency cetaceans (sperm, Arnoux's beaked, , southern bottlenose, strap-toothed beaked, killer, and long-finned pilot whale, and hourglass dolphin) (Southall et al., 2007). Of the 5 pinniped species likely to occur in NSF and ASC's action area, all are classified as phocid pinnipeds (crabeater, leopard, Ross, Weddell, and southern elephant seal) (Southall et al., 2007). A species functional hearing group is a consideration when we analyze the effects of exposure to sound on marine mammals.

Acoustic stimuli generated by the operation of the airguns, which introduce sound into the marine environment, may have the potential to cause Level B harassment of marine mammals in the study area. The effects of sounds from airgun operations might include one or more of the following: tolerance, masking of natural sounds, behavioral disturbance, temporary or permanent hearing impairment, or non-auditory physical or physiological effects (Richardson et al., 1995; Gordon et al., 2004; Nowacek et al., 2007; Southall et al., 2007). Permanent hearing impairment, in the unlikely event that it occurred, would constitute injury, but temporary threshold shift (TTS) is not an injury (Southall et al., 2007). Although the possibility cannot be entirely excluded, it is unlikely that the planned project would result in any cases of temporary or permanent hearing impairment, or any significant non-auditory physical or physiological effects. Based on the available data and studies described here, some behavioral disturbance is expected, but NMFS expects the disturbance to be localized and short-term. NMFS described the range of potential effects from the specified activity in the notice of the proposed IHA (79 FR 68512,

November 17, 2014). A more comprehensive review of these issues can be found in the “Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement prepared for Marine Seismic Research that is funded by the National Science Foundation and conducted by the U.S. Geological Survey” (NSF/USGS, 2011) and L-DEO’s “Environmental Assessment of a Marine Geophysical Survey by the R/V Marcus G. Langseth in the Atlantic Ocean off Cape Hatteras, September to October 2014.”

The notice of the proposed IHA (79 FR 68512, November 17, 2014) included a discussion of the effects of sounds from airguns, bathymetric surveys, core sampling, icebreaking activities, and other acoustic devices and sources on mysticetes and odontocetes, including tolerance, masking, behavioral disturbance, hearing impairment, and other non-auditory physical effects. The notice of the proposed IHA (79 FR 68512, November 17, 2014) also included a discussion of the effects of vessel movement and collisions as well as entanglement. NMFS refers the readers to NSF and ASC’s IHA application and IEE/EA for additional information on the behavioral reactions (or lack thereof) by all types of marine mammals to seismic vessels.

Anticipated Effects on Marine Mammal Habitat, Fish, and Invertebrates

NMFS included a detailed discussion of the potential effects of this action on marine mammal habitat, including physiological and behavioral effects on marine fish and invertebrates, in the notice of the proposed IHA (79 FR 68512, November 17, 2014). The low-energy seismic survey is not anticipated to have any permanent impact on habitats used by the marine mammals in the study area, including the food sources they use (i.e. fish and invertebrates). Additionally, no physical damage to any habitat is anticipated as a result of conducting airgun operations during the low-energy seismic survey. While NMFS anticipates that the specified activity may

result in marine mammals avoiding certain areas due to temporary ensonification, this impact to habitat is temporary and reversible, which was considered in further detail earlier in the notice of the proposed IHA (79 FR 68512, November 17, 2014), as behavioral modification. The main impact associated with the planned activity will be temporarily elevated noise levels and the associated direct effects on marine mammals.

Mitigation

In order to issue an Incidental Take Authorization (ITA) under section 101(a)(5)(D) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to such activity, and other means of effecting the least practicable impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and the availability of such species or stock for taking for certain subsistence uses (where relevant).

NSF and ASC reviewed the following source documents and have incorporated a suite of appropriate mitigation measures into their project description.

(1) Protocols used during previous NSF and USGS-funded seismic research cruises as approved by NMFS and detailed in the “Final Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement for Marine Seismic Research Funded by the National Science Foundation or Conducted by the U.S. Geological Survey;”

(2) Previous IHA applications and IHAs approved and authorized by NMFS; and

(3) Recommended best practices in Richardson et al. (1995), Pierson et al. (1998), and Weir and Dolman, (2007).

To reduce the adverse impacts from acoustic stimuli associated with the planned activities, NSF, ASC, and their designees must implement the following mitigation measures for marine mammals:

- (1) Exclusion zones around the sound source;
- (2) Speed and course alterations;
- (3) Shut-down procedures; and
- (4) Ramp-up procedures.

Exclusion Zones – During pre-planning of the cruise, the smallest airgun array was identified that could be used and still meet the geophysical scientific objectives. NSF and ASC use radii to designate exclusion and buffer zones and to estimate take for marine mammals.

Table 3 (see below) shows the distances at which one would expect to receive three sound levels (160, 180, and 190 dB) from the two GI airgun array. The 180 and 190 dB level shut-down criteria are generally applicable to cetaceans and pinnipeds, respectively, as specified by NMFS (2000). NSF and ASC used these levels to establish the exclusion and buffer zones.

Table 3. Predicted and modeled (two 105 in³ GI airgun array) distances to which sound levels \geq 160, 180, and 190 dB re 1 μ Pa (rms) could be received in deep water during the low-energy seismic survey in the Ross Sea, January to February 2015.

| Source and Total Volume | Tow Depth (m) | Water Depth (m) | Predicted RMS Radii Distances (m) for 2 GI Airgun Array | | |
|---------------------------------------|---------------|-----------------------------|---|----------------|---|
| | | | 160 dB | 180 dB | 190 dB |
| Two GI Airguns (105 in ³) | 3 to 4 | Intermediate (100 to 1,000) | 1,109 (3,638.5 ft) | 111 (364.2 ft) | 36 (118.1 ft) *100 will be used for pinnipeds as described in NSF/USGS PEIS* |

Based on the NSF/USGS PEIS and Record of Decision, for situations in which incidental take of marine mammals is anticipated, NSF and ASC have established standard exclusion zones of 100 m for cetaceans and pinnipeds for all low-energy acoustic sources in water depths greater than

100 m. While NMFS views the 100 m for pinnipeds appropriate, NMFS is requiring an exclusion zone of 111 m for cetaceans based on the predicted and modeled values by L-DEO and to be more conservative. See below for further explanation.

Received sound levels have been modeled by L-DEO for a number of airgun configurations, including two 45 in³ Nucleus G airguns, in relation to distance and direction from the airguns (see Figure 2 of Appendix B of the IHA application). In addition, propagation measurements of pulses from two GI airguns have been reported for shallow water (approximately 30 m [98.4 ft] depth) in the GOM (Tolstoy et al., 2004). However, measurements were not made for the two GI airguns in deep water. The model does not allow for bottom interactions, and is most directly applicable to deep water. Based on the modeling, estimates of the maximum distances from the GI airguns where sound levels are predicted to be 190, 180, and 160 dB re 1 μ Pa (rms) in intermediate water were determined (see Table 3 above).

Empirical data concerning the 190, 180, and 160 dB (rms) distances were acquired for various airgun arrays based on measurements during the acoustic verification studies conducted by L-DEO in the northern GOM in 2003 (Tolstoy et al., 2004) and 2007 to 2008 (Tolstoy et al., 2009). Results of the 18 and 36 airgun arrays are not relevant for the two GI airguns to be used in the planned low-energy seismic survey because the airgun arrays are not the same size or volume. The empirical data for the 6, 10, 12, and 20 airgun arrays indicate that, for deep water, the L-DEO model tends to overestimate the received sound levels at a given distance (Tolstoy et al., 2004). Measurements were not made for the two GI airgun array in deep water; however, NSF and ASC plan to use the safety radii predicted by L-DEO's model for the proposed GI airgun operations in intermediate water, although they are likely conservative given the empirical results for the other arrays.

Based on the modeling data, the outputs from the pair of 105 in³ GI airguns planned to be used during the low-energy seismic survey are considered a low-energy acoustic source in the NSF/USGS PEIS (2011) for marine seismic research. A low-energy seismic source was defined in the NSF/USGS PEIS as an acoustic source whose received level at 100 m is less than 180 dB. The NSF/USGS PEIS also established for these low-energy sources, a standard exclusion zone of 100 m for all low-energy sources in water depths greater than 100 m. This standard 100 m exclusion zone will be used during the low-energy seismic survey. The 180 and 190 dB (rms) radii are typically used as shut-down criteria applicable to cetaceans and pinnipeds, respectively; these levels were used to establish exclusion zones. Therefore, the assumed 180 and 190 dB radii are 100 m for intermediate and deep water. If the PSO detects a marine mammal within or about to enter the appropriate exclusion zone, the airguns will be shut-down immediately.

Speed and Course Alterations – If a marine mammal is detected outside the exclusion zone and, based on its position and direction of travel (relative motion), is likely to enter the exclusion zone, changes of the vessel's speed and/or direct course will be considered if this does not compromise operational safety or damage the deployed equipment. This will be done if operationally practicable while minimizing the effect on the planned science objectives. For marine seismic surveys towing large streamer arrays, course alterations are not typically implemented due to the vessel's limited maneuverability. However, the Palmer will be towing a relatively short hydrophone streamer, so its maneuverability during operations with the hydrophone streamer will not be limited as vessels towing long streamers, thus increasing the potential to implement course alterations, if necessary. After any such speed and/or course alteration is begun, the marine mammal activities and movements relative to the seismic vessel will be closely monitored to ensure that the marine mammal does not approach within the

exclusion zone. If the marine mammal appears likely to enter the exclusion zone, further mitigation actions will be taken, including further speed and/or course alterations, and/or shut-down of the airgun(s). Typically, during airgun operations, the source vessel is unable to change speed or course, and one or more alternative mitigation measures will need to be implemented.

Shut-down Procedures - If a marine mammal is detected outside the exclusion zone for the airgun(s) and the vessel's speed and/or course cannot be changed to avoid having the animal enter the exclusion zone, NSF and ASC will shut-down the operating airgun(s) before the animal is within the exclusion zone. Likewise, if a marine mammal is already within the exclusion zone when first detected, the seismic source will be shut-down immediately.

Following a shut-down, NSF and ASC will not resume airgun activity until the marine mammal has cleared the exclusion zone. NSF and ASC will consider the animal to have cleared the exclusion zone if:

- A PSO has visually observed the animal leave the exclusion zone, or
- A PSO has not sighted the animal within the exclusion zone for 15 minutes for species with shorter dive durations (i.e., small odontocetes and pinnipeds), or 30 minutes for species with longer dive durations (i.e., mysticetes and large odontocetes, including sperm, killer, and beaked whales).

Although power-down procedures are often standard operating practice for seismic surveys, they will not be used during this planned low-energy seismic survey because powering-down from two airguns to one airgun will make only a small difference in the exclusion zone(s) that probably will not be enough to allow continued one-airgun operations if a marine mammal came within the exclusion zone for two airguns.

Ramp-up Procedures – Ramp-up of an airgun array provides a gradual increase in sound levels, and involves a step-wise increase in the number and total volume of airguns firing until the full volume of the airgun array is achieved. The purpose of a ramp-up is to “warn” marine mammals in the vicinity of the airguns and to provide the time for them to leave the area, avoiding any potential injury or impairment of their hearing abilities. NSF and ASC will follow a ramp-up procedure when the airgun array begins operating after a specified period without airgun operations or when a shut-down has exceeded that period. NSF and ASC proposed that, for the present cruise, this period will be approximately 15 minutes. SIO, L-DEO, and USGS have used similar periods (approximately 15 minutes) during previous low-energy seismic surveys.

Ramp-up will begin with a single GI airgun (105 in³). The second GI airgun (105 in³) will be added after 5 minutes. During ramp-up, the PSOs will monitor the exclusion zone, and if marine mammals are sighted, a shut-down will be implemented as though both GI airguns were operational.

If the complete exclusion zone has not been visible for at least 30 minutes prior to the start of operations in either daylight or nighttime, NSF and ASC will not commence the ramp-up. Given these provisions, it is likely that the airgun array will not be ramped-up from a complete shut-down during low light conditions, at night, or in thick fog, because the outer part of the exclusion zone for that array will not be visible during those conditions. If one airgun has been operating, ramp-up to full power will be permissible during low light, at night, or in poor visibility, on the assumption that marine mammals will be alerted to the approaching seismic vessel by the sounds from the single airgun and could move away if they choose. NSF and ASC

will not initiate a ramp-up of the airguns if a marine mammal is sighted within or near the applicable exclusion zones.

Mitigation Conclusions

NMFS has carefully evaluated the applicant's mitigation measures and has considered a range of other measures in the context of ensuring that NMFS prescribes the means of effecting the least practicable impact on the affected marine mammal species and stocks and their habitat. NMFS's evaluation of potential measures included consideration of the following factors in relation to one another:

- (1) The manner in which, and the degree to which, the successful implementation of the measure is expected to minimize adverse impacts to marine mammals;
- (2) The proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and
- (3) The practicability of the measure for applicant implementation including consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the activity.

Any mitigation measure(s) prescribed by NMFS should be able to accomplish, have a reasonable likelihood of accomplishing (based on current science), or contribute to the accomplishment of one or more of the general goals listed below:

- (1) Avoidance of minimization of injury or death of marine mammals wherever possible (goals 2, 3, and 4 may contribute to this goal).
- (2) A reduction in the numbers of marine mammals (total number or number at biologically important time or location) exposed to received levels of airguns, or other activities

expected to result in the take of marine mammals (this goal may contribute to 1, above, or to reducing harassment takes only).

(3) A reduction in the number of time (total number or number at biologically important time or location) individuals will be exposed to received levels of airguns, or other activities expected to result in the take of marine mammals (this goal may contribute to 1, above, or to reducing harassment takes only).

(4) A reduction in the intensity of exposures (either total number or number at biologically important time or location) to received levels of airguns, or other activities, or other activities expected to result in the take of marine mammals (this goal may contribute to a, above, or to reducing the severity of harassment takes only).

(5) Avoidance or minimization of adverse effects to marine mammal habitat, paying special attention to the food base, activities that block or limit passage to or from biologically important areas, permanent destruction of habitat, or temporary destruction/disturbance of habitat during a biologically important time.

(6) For monitoring directly related to mitigation – an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation.

Based on NMFS's evaluation of the applicant's measures, as well as other measures considered by NMFS or recommended by the public, NMFS has determined that the mitigation measures provide the means of effecting the least practicable impact on marine mammal species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance.

Monitoring and Reporting

In order to issue an ITA for an activity, section 101(a)(5)(D) of the MMPA states that NMFS must set forth “requirements pertaining to the monitoring and reporting of such taking.” The MMPA implementing regulations at 50 CFR 216.104 (a)(13) indicate that requests for IHAs must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present in the action area. NSF and ASC submitted a marine mammal monitoring plan as part of the IHA application. It can be found in Section 13 of the IHA application. The plan has not been modified or supplemented between the notice of the proposed IHA (79 FR 68512, November 17, 2014) and this final notice announcing the issuance of the IHA, as none of the comments or new information received from the public during the public comment period required a change to the plan.

Monitoring measures prescribed by NMFS should accomplish one or more of the following general goals:

(1) An increase in the probability of detecting marine mammals, both within the mitigation zone (thus allowing for more effective implementation of the mitigation) and in general to generate more data to contribute to the analyses mentioned below;

(2) An increase in our understanding of how many marine mammals are likely to be exposed to levels of sound (airguns) that we associate with specific adverse effects, such as behavioral harassment, TTS, or PTS;

(3) An increase in our understanding of how marine mammals respond to stimuli expected to result in take and how anticipated adverse effects on individuals (in different ways and to varying degrees) may impact the population, species, or stock (specifically through effects on annual rates of recruitment or survival) through any of the following methods:

- Behavioral observations in the presence of stimuli compared to observations in the absence of stimuli (need to be able to accurately predict received level, distance from source, and other pertinent information);
 - Physiological measurements in the presence of stimuli compared to observations in the absence of stimuli (need to be able to accurately predict received level, distance from source, and other pertinent information); and
 - Distribution and/or abundance comparisons in times or areas with concentrated stimuli versus times or areas without stimuli
- (4) An increased knowledge of the affected species; and
- (5) An increase in our understanding of the effectiveness of certain mitigation and monitoring measures.

Monitoring

NSF and ASC will conduct marine mammal monitoring during the low-energy seismic survey, in order to implement the mitigation measures that require real-time monitoring and to satisfy the anticipated monitoring requirements of the IHA. NSF and ASC's "Monitoring Plan" is described below this section. NSF and ASC understand that this monitoring plan will be subject to review by NMFS and that refinements may be required. The monitoring work described here has been planned as a self-contained project independent of any other related monitoring projects that may be occurring simultaneously in the same regions. NSF and ASC are prepared to discuss coordination of their monitoring program with any related work that might be done by other groups insofar as this is practical and desirable.

Vessel-based Visual Monitoring

NSF and ASC's PSOs will be based aboard the seismic source vessel and will watch for marine mammals near the vessel during icebreaking activities, daytime airgun operations and during any ramp-ups of the airguns at night. PSOs will also watch for marine mammals near the seismic vessel for at least 30 minutes prior to the start of airgun operations and after an extended shut-down (i.e., greater than approximately 15 minutes for this low-energy seismic survey). When feasible, PSOs will conduct observations during daytime periods when the seismic system is not operating (such as during transits) for comparison of sighting rates and behavior with and without airgun operations and between acquisition periods. Based on PSO observations, the airguns will be shut-down when marine mammals are observed within or about to enter a designated exclusion zone.

During seismic operations in the Ross Sea, at least three PSOs will be based aboard the Palmer. At least one PSO will stand watch at all times while the Palmer is operating airguns during the low-energy seismic survey; this procedure will also be followed when the vessel is in transit and conducting icebreaking. NSF and ASC will appoint the PSOs with NMFS's concurrence. The lead PSO will be experienced with marine mammal species in the Ross Sea and/or Southern Ocean, the second and third PSOs will receive additional specialized training from the lead PSO to ensure that they can identify marine mammal species commonly found in the Ross Sea and Southern Ocean. Observations will take place during ongoing daytime operations and ramp-ups of the airguns. During the majority of seismic operations, at least one PSO will be on duty from observation platforms (i.e., the best available vantage point on the source vessel) to monitor marine mammals near the seismic vessel. PSO(s) will be on duty in shifts no longer than 4 hours in duration. Other crew will also be instructed to assist in detecting

marine mammals and implementing mitigation requirements (if practical). Before the start of the low-energy seismic survey, the crew will be given additional instruction on how to do so.

The Palmer is a suitable platform for marine mammal observations and will serve as the platform from which PSOs will watch for marine mammals before and during seismic operations. Two locations are likely as observation stations onboard the Palmer. One observing station is located on the bridge level, with the PSO eye level at approximately 16.5 m (54.1 ft) above the waterline and the PSO will have a good view around the entire vessel. In addition, there is an aloft observation tower for the PSO approximately 24.4 m (80.1 ft) above the waterline that is protected from the weather, and affords PSOs an even greater view. The approximate view around the vessel from the bridge is 270° and from the aloft observation tower is 360°.

Standard equipment for PSOs will be reticle binoculars. Night-vision equipment will not be available or necessary as there will be 24-hour daylight or nautical twilight during the cruise. The PSOs will be in communication with ship's officers on the bridge and scientists in the vessel's operations laboratory, so they can advise promptly of the need for avoidance maneuvers or seismic source shut-down. During daylight, the PSO(s) will scan the area around the vessel systematically with reticle binoculars (e.g., 7 x 50 Fujinon FMTRC-SX) and the naked eye. These binoculars will have a built-in daylight compass. Estimating distances is done primarily with the reticles in the binoculars. The PSO(s) will be in direct (radio) wireless communication with ship's officers on the bridge and scientists in the vessel's operations laboratory during seismic operations, so they can advise the vessel operator, science support personnel, and the science party promptly of the need for avoidance maneuvers or a shut-down of the seismic source. PSOs will monitor for the presence pinnipeds and cetaceans during icebreaking

activities, and will be limited to those marine mammal species in proximity to the ice margin habitat. Observations within the buffer zone will also include pinnipeds that may be present on the surface of the sea ice (i.e., hauled-out) and that could potentially dive into the water as the vessel approaches, indicating disturbance from noise generated by icebreaking activities).

When a marine mammal is detected within or about to enter the designated exclusion zone, the airguns will immediately be shut-down, unless the vessel's speed and/or course can be changed to avoid having the animal enter the exclusion zone. The PSO(s) will continue to maintain watch to determine when the animal is outside the exclusion zone by visual confirmation. Airgun operations will not resume until the animal is confirmed to have left the exclusion zone, or is not observed after 15 minutes for species with shorter dive durations (small odontocetes and pinnipeds) or 30 minutes for species with longer dive durations (mysticetes and large odontocetes, including sperm, killer, and beaked whales).

PSO Data and Documentation

PSOs will record data to estimate the numbers of marine mammals exposed to various received sound levels and to document apparent disturbance reactions or lack thereof. Data will be used to estimate numbers of animals potentially "taken" by harassment (as defined in the MMPA). They will also provide information needed to order a shut-down of the airguns when a marine mammal is within or near the exclusion zone. Observations will also be made during icebreaking activities as well as daylight periods when the Palmer is underway without seismic airgun operations (i.e., transits to, from, and through the study area) to collect baseline biological data.

When a sighting is made, the following information about the sighting will be recorded:

1. Species, group size, age/size/sex categories (if determinable), behavior when first sighted and after initial sighting, heading (if consistent), bearing and distance from seismic vessel, sighting cue, apparent reaction to the seismic source or vessel (e.g., none, avoidance, approach, paralleling, etc.), and behavioral pace.

2. Time, location, heading, speed, activity of the vessel (including number of airguns operating and whether in state of ramp-up or shut-down), sea state, wind force, visibility, and sun glare.

The data listed under (2) will also be recorded at the start and end of each observation watch, and during a watch whenever there is a change in one or more of the variables.

All observations, as well as information regarding ramp-ups or shut-downs will be recorded in a standardized format. Data will be entered into an electronic database. The data accuracy will be verified by computerized data validity checks as the data are entered and by subsequent manual checking of the database by the PSOs at sea. These procedures will allow initial summaries of data to be prepared during and shortly after the field program, and will facilitate transfer of the data to statistical, graphical, and other programs for further processing and archiving.

Results from the vessel-based observations will provide the following information:

1. The basis for real-time mitigation (airgun shut-down).
2. Information needed to estimate the number of marine mammals potentially taken by harassment, which must be reported to NMFS.
3. Data on the occurrence, distribution, and activities of marine mammals in the area where the seismic study is conducted.

4. Information to compare the distance and distribution of marine mammals relative to the source vessel at times with and without airgun operations and icebreaking activities.

5. Data on the behavior and movement patterns of marine mammals seen at times with and without airgun operations and icebreaking activities.

Reporting

NSF and ASC will submit a comprehensive report to NMFS within 90 days after the end of the cruise. The report will describe the operations that were conducted and sightings of marine mammals near the operations. The report submitted to NMFS will provide full documentation of methods, results, and interpretation pertaining to all monitoring. The 90-day report will summarize the dates and locations of seismic operations and all marine mammal sightings (i.e., dates, times, locations, activities, and associated seismic survey activities). The report will include, at a minimum:

- Summaries of monitoring effort – total hours, total distances, and distribution of marine mammals through the study period accounting for Beaufort sea state and other factors affecting visibility and detectability of marine mammals;
- Analyses of the effects of various factors influencing detectability of marine mammals including Beaufort sea state, number of PSOs, and fog/glare;
- Species composition, occurrence, and distribution of marine mammals sightings including date, water depth, numbers, age/size/gender, and group sizes, and analyses of the effects of airgun operations and icebreaking activities;
- Sighting rates of marine mammals during periods with and without airgun operations and icebreaking activities (and other variables that could affect detectability);
- Initial sighting distances versus airgun operations and icebreaking activity state;

- Closest point of approach versus airgun operations and icebreaking activity state;
- Observed behaviors and types of movements versus airgun operations and icebreaking activity state;
- Numbers of sightings/individuals seen versus airgun operations and icebreaking activity state; and
- Distribution around the source vessel versus airgun operations and icebreaking activity state.

The report will also include estimates of the number and nature of exposures that could result in “takes” of marine mammals by harassment or in other ways. NMFS will review the draft report and provide any comments it may have, and NSF and ASC will incorporate NMFS’s comments and prepare a final report. After the report is considered final, it will be publicly available on the NMFS website at: <http://www.nmfs.noaa.gov/pr/permits/incidental/>**Error!**

Hyperlink reference not valid..

Reporting Prohibited Take - In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by this IHA, such as an injury (Level A harassment), serious injury or mortality (e.g., ship-strike, gear interaction, and/or entanglement), NSF and ASC shall immediately cease the specified activities and immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS at 301-427-8401 and/or by email to Jolie.Harrison@noaa.gov and Howard.Goldstein@noaa.gov. The report must include the following information:

- Time, date, and location (latitude/longitude) of the incident;
- Name and type of vessel involved;
- Vessel’s speed during and leading up to the incident;

- Description of the incident;
- Status of all sound source use in the 24 hours preceding the incident;
- Water depth;
- Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility);
- Description of all marine mammal observations in the 24 hours preceding the incident;
- Species identification or description of the animal(s) involved;
- Fate of the animal(s); and
- Photographs or video footage of the animal(s) (if equipment is available).

Activities shall not resume until NMFS is able to review the circumstances of the prohibited take. NMFS shall work with NSF and ASC to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. NSF and ASC may not resume their activities until notified by NMFS via letter or email, or telephone.

Reporting an Injured or Dead Marine Mammal with an Unknown Cause of Death - In the event that NSF and ASC discover an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition), NSF and ASC shall immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401, and/or by email to Jolie.Harrison@noaa.gov and Howard.Goldstein@noaa.gov. The report must include the same information identified in the paragraph above. Activities may continue while NMFS reviews the circumstances of the

incident. NMFS shall work with NSF and ASC to determine whether modifications in the activities are appropriate.

Reporting an Injured or Dead Marine Mammal Not Related to the Activities - In the event that NSF and ASC discover an injured or dead marine mammal, and the lead PSO determines that the injury or death is not associated with or related to the activities authorized in the IHA (e.g., previously wounded animal, carcass with moderate or advanced decomposition, or scavenger damage), NSF and ASC shall report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, at 301-427-8401, and/or by email to Jolie.Harrison@noaa.gov and Howard.Goldstein@noaa.gov, within 24 hours of discovery. NSF and ASC shall provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS. Activities may continue while NMFS reviews the circumstances of the incident.

Estimated Take by Incidental Harassment

Except with respect to certain activities not pertinent here, the MMPA defines "harassment" as: any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment]; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [Level B harassment].

Table 4. NMFS's current underwater acoustic exposure criteria:

| Impulsive (Non-Explosive) Sound | | |
|---------------------------------|---|--|
| Criterion | Criterion Definition | Threshold |
| Level A harassment (injury) | Permanent threshold shift (PTS) (any level above that which is known to cause TTS) | 180 dB re 1 μ Pa-m (root means square [rms]) (cetaceans) |
| | | 190 dB re 1 μ Pa-m (rms) (pinnipeds) |
| Level B harassment | Behavioral disruption (for impulsive noise) | 160 dB re 1 μ Pa-m (rms) |
| Level B harassment | Behavioral disruption | 120 dB re 1 μ Pa-m (rms) |

| | | |
|--|------------------------|--|
| | (for continuous noise) | |
|--|------------------------|--|

Level B harassment is anticipated and authorized as a result of the low-energy seismic survey in the Ross Sea. Acoustic stimuli (i.e., increased underwater sound) generated during the operation of the seismic airgun array and icebreaking activities are expected to result in the behavioral disturbance of some marine mammals. There is no evidence that the planned activities for which NSF and ASC seek the IHA could result in injury, serious injury, or mortality. The required mitigation and monitoring measures will minimize any potential risk for injury, serious injury, or mortality.

The following sections describe NSF and ASC's methods to estimate take by incidental harassment and present the applicant's estimates of the numbers of marine mammals that could be affected during the low-energy seismic survey in the Ross Sea. The estimates are based on a consideration of the number of marine mammals that could be harassed during the approximately 200 hours and 1,750 km of seismic airgun operations with the two GI airgun array to be used and 500 km of icebreaking activities.

During simultaneous operations of the airgun array and the other sound sources, any marine mammals close enough to be affected by the single and multi-beam echosounders, ADCP, or sub-bottom profiler will already be affected by the airguns. During times when the airguns are not operating, it is unlikely that marine mammals will exhibit more than minor, short-term responses to the echosounders, ADCPs, and sub-bottom profiler given their characteristics (e.g., narrow, downward-directed beam) and other considerations described previously in the notice of the proposed IHA (79 FR 68512, November 17, 2014). Therefore, for this activity, take was not authorized specifically for these sound sources beyond that which is already planned to be authorized for airguns and icebreaking activities.

There are no stock assessments and very limited population information available for marine mammals in the Ross Sea. Published estimates of marine mammal densities are limited for the planned low-energy seismic survey's action area. Available density estimates (using number of animals per km²) from the Naval Marine Species Density Database (NMSDD) (NAVFAC, 2012) were used for one mysticete and one odontocete (i.e., sei whale and Arnoux's beaked whale). Densities for minke (including the dwarf sub-species) whales were unavailable and the densities for Antarctic minke whales were used as proxies.

For other mysticetes and odontocetes, reported sightings data from one previous research survey (i.e., International Whaling Commission Southern Ocean Whale and Ecosystem Research [IWC SOWER]) in the Ross Sea and vicinity were used to identify species that may be present in the proposed action area and to estimate densities. Available sightings data from the 2002 to 2003 IWC SOWER Circumpolar Cruise, Area V (Ensor *et al.*, 2003) were used to estimate densities for five mysticetes (i.e., humpback, Antarctic minke, minke, fin, and blue whale) and six odontocetes (i.e., sperm, southern bottlenose, strap-toothed beaked, killer, long-finned pilot whale and hourglass dolphin). Densities of pinnipeds (i.e., crabeater, leopard, Ross, Weddell, and southern elephant seal) were estimated using data from two surveys (NZAI, 2001; Pinkerton and Bradford-Grieve, n.d.) and dividing the estimated population of animals by the area of the Ross Sea (approximately 300,000 km² [87,466 nmi²]). While these surveys were not specifically designed to quantify marine mammal densities, there was sufficient information to develop density estimates.

The densities used for purposes of estimating potential take do not take into account the patchy distributions of marine mammals in an ecosystem, at least on the moderate to fine scales over which they are known to occur. Instead, animals are considered evenly distributed

throughout the assessed study area and seasonal movement patterns are not taken into account as none are available.

Some marine mammals that were present in the area during these surveys may not have been observed. Southwell *et al.* (2008) suggested a 20 to 40% sighting factor for pinnipeds, and the most conservative value from Southwell *et al.* (2008) was applied for cetaceans. Therefore, the estimated frequency of sightings data in the notice of the proposed IHA (79 FR 68512, November 17, 2014) and this IHA for cetaceans incorporates a correction factor of 5, which assumes only 20% of the animals present were reported due to sea and other environmental conditions that may have hindered observation, and therefore, there were 5 times more cetaceans actually present. The correction factor (20%) was intended to conservatively account for unobserved (i.e., not sighted and reported) animals.

The pinnipeds that may be present in the study area during the planned action and are expected to be observed occur mostly near pack ice, coastal areas, and rocky habitats on the shelf, and are not prevalent in open sea areas where the low-energy seismic survey will be conducted. Because density estimates for pinnipeds in the sub-Antarctic and Antarctic regions typically represent individuals that have hauled-out of the water, those estimates are not necessarily representative of individuals that are in the water and could be potentially exposed to underwater sounds during the seismic airgun operations and icebreaking activities; therefore, the pinniped densities have been adjusted downward to account for this consideration. Take was not requested for Antarctic and Subantarctic seals because preferred habitat for these species is not within the planned action area. Although there is some uncertainty about the representativeness of the data and the assumptions used in the calculations below, the approach used here is believed to be the best available approach, using the best available science.

Table 5. Estimated densities and possible number of marine mammal species that might be exposed to greater than or equal to 120 dB (icebreaking) and 160 dB (airgun operations) during NSF and ASC's low-energy seismic survey (approximately 500 km of tracklines/approximately 21,540 km² ensonified area for icebreaking activities and approximately 1,750 km of tracklines/approximately 3,882 km² [1.109 km x 2 x 1,750 km] ensonified area for airgun operations) in the Ross Sea, January to February 2015.

| Species | Density (# of animals/km ²) ¹ | Calculated Take from Seismic Airgun Operations (i.e., Estimated Number of Individuals Exposed to Sound Levels ≥ 160 dB re 1 μPa) ² | Calculated Take from Icebreaking Operations (i.e., Estimated Number of Individuals Exposed to Sound Levels ≥ 120 dB re 1 μPa) ³ | Total Authorized Take | Abundance ⁴ | Approximate Percentage of Population Estimate (Authorized Take) ⁵ | Population Trend ⁶ |
|--|---|--|--|-----------------------------|---|--|--------------------------------------|
| Mysticetes | | | | | | | |
| Southern right whale | NA | 0 | 0 | 0 | 8,000 to 15,000 | NA | Increasing at 7 to 8% per year |
| Humpback whale | 0.0321169 | 125 | 692 | 817 | 35,000 to 40,000 – Worldwide 9,484 – Scotia Sea and Antarctica Peninsula | 0.03 – Worldwide 9.88 – Scotia Sea and Antarctic Peninsula | Increasing |
| Antarctic minke whale | 0.0845595 | 329 | 1,822 | 2,151 | Several 100,000 – Worldwide 18,125 – Scotia Sea and Antarctica Peninsula | 11.87 – Scotia Sea and Antarctica Peninsula | Stable |
| Minke whale (including dwarf minke whale sub- species) | 0.08455 | 329 | 1,822 | 2,151 | NA | NA | NA |

| | | | | | | | |
|----------------------------|-----------|-------|--------|--------|--|---|------------|
| Sei whale | 0.0046340 | 18 | 100 | 118 | 80,000 - Worldwide | 0.15 | NA |
| Fin whale | 0.0306570 | 120 | 661 | 781 | 140,000 – Worldwide 4,672 – Scotia Sea and Antarctica Peninsula | 0.56 - Worldwide 16.72 – Scotia Sea and Antarctica Peninsula | NA |
| Blue whale | 0.0065132 | 26 | 141 | 167 | 8,000 to 9,000 – Worldwide 1,700 – Southern Ocean | 2.09 – Worldwide 9.82 – Southern Ocean | NA |
| Odontocetes | | | | | | | |
| Sperm whale | 0.0098821 | 39 | 213 | 252 | 360,000 – Worldwide 9,500 - Antarctic | 0.07 – Worldwide 2.65 - Antarctic | NA |
| Arnoux's beaked whale | 0.0134420 | 53 | 290 | 343 | NA | NA | NA |
| Strap-toothed beaked whale | 0.0044919 | 18 | 97 | 115 | NA | NA | NA |
| Southern bottlenose whale | 0.0117912 | 46 | 254 | 300 | 50,000 – South of Antarctic Convergence | 0.6 | NA |
| Killer whale | 0.0208872 | 82 | 450 | 532 | 80,000 – South of Antarctic Convergence 25,000 – Southern Ocean | 0.67 – South of Antarctic Convergence 2.13 – Southern Ocean | NA |
| Long-finned pilot whale | 0.0399777 | 156 | 862 | 1,018 | 200,000 – South of Antarctic Convergence | 0.51 | NA |
| Hourglass dolphin | 0.0189782 | 74 | 409 | 483 | 144,000 – South of Antarctic Convergence | 0.34 | NA |
| Pinnipeds | | | | | | | |
| Crabeater seal | 0.6800000 | 2,640 | 14,648 | 17,288 | 5,000,000 to 15,000,000 - Worldwide | 0.35 | Increasing |
| Leopard seal | 0.0266700 | 104 | 575 | 679 | 220,000 to 440,000 - Worldwide | 0.31 | NA |
| Ross seal | 0.0166700 | 65 | 360 | 425 | 130,000 to 20,000 to | 2.13 | NA |

| | | | | | | | |
|------------------------------|-----------|-----|-------|-------|--|---|--|
| | | | | | 220,000 - Worldwide | | |
| Weddell seal | 0.1066700 | 415 | 2,298 | 2,713 | 500,000 to 1,000,000 - Worldwide | 0.54 | NA |
| Southern elephant seal | 0.0001300 | 1 | 3 | 4 | 640,000 to 650,000 – Worldwide; 470,000 – South Georgia Island | <0.01 – Worldwide or South Georgia Island | Increasing, decreasing, or stable depending on breeding population |

NA = Not available or not assessed.

¹ Densities based on sightings from IWC SOWER Report 2002, NMSDD, or State of the Ross Sea Region (NZAI, 2001) data.

² Calculated take is estimated density (reported density times correction factor) multiplied by the area ensonified to 160 dB (rms) around the planned seismic lines, increased by 25% for contingency.

³ Calculated take is estimated density (reported density times correction factor) multiplied by the area ensonified to 120 dB (rms) around the planned transit lines where icebreaking activities may occur.

⁴ See population estimates for marine mammal species in Table 2 (above).

⁵ Total requested authorized takes expressed as percentages of the species or regional populations.

⁶ Jefferson *et al.* (2008).

Icebreaking in Antarctic waters will occur, as necessary, between the latitudes of approximately 76 to 78° South and between 165 and 170° West. Based on a historical sea ice extent and the planned tracklines, it is estimated that the Palmer will actively break ice up to a distance of 500 km. Based on the ship's speed of 5 kts under moderate ice conditions, this distance represents approximately 54 hours of icebreaking activities. This calculation is likely an overestimation because icebreakers often follow leads when they are available and thus do not break ice at all times. The estimated number of takes for pinnipeds accounts for both animals that may be in the water and those hauled-out on ice surfaces. While the number of cetaceans that may be encountered within the ice margin habitat will be expected to be less than open water, the estimates utilize densities for open water and therefore represent conservative estimates.

Numbers of marine mammals that might be present and potentially disturbed are estimated based on the available data about marine mammal distribution and densities in the planned Ross Sea study area. NSF and ASC estimated the number of different individuals that may be exposed to airgun sounds with received levels greater than or equal to 160 dB re 1 μ Pa (rms) for seismic airgun operations and greater than or equal to 120 dB re 1 μ Pa (rms) for icebreaking activities on one or more occasions by considering the total marine area that will be within the 160 dB radius around the operating airgun array and 120 dB radius for icebreaking activities on at least one occasion and the expected density of marine mammals in the area (in the absence of the a seismic survey and icebreaking activities). The number of possible exposures can be estimated by considering the total marine area that will be within the 160 dB radius (the diameter is 1,109 m multiplied by 2) around the operating airguns. The ensonified area for icebreaking was estimated by multiplying the distance of the icebreaking activities (500 km) by

the estimated diameter for the area within the 120 dB radius (i.e., diameter is 43.08 km [21.54 km x 2]). The 160 dB radii are based on acoustic modeling data for the airguns that may be used during the planned action (see Attachment B of the IHA application). As summarized in Table 3 (see above and Table 8 of the IHA application), the modeling results for the planned low-energy seismic airgun array indicate the received levels are dependent on water depth. Since the majority of the planned airgun operations will be conducted in waters 100 to 1,000 m deep, the buffer zone of 1,109 m for the two 105 in³ GI airguns was used.

The number of different individuals potentially exposed to received levels greater than or equal to 160 dB re 1 μ Pa (rms) from seismic airgun operations and 120 dB re 1 μ Pa (rms) for icebreaking activities was calculated by multiplying:

- (1) The expected species density (in number/km²); and
- (2) The anticipated area to be ensonified to that level during airgun operations and icebreaking activities.

Applying the approach described above, approximately 3,882 km² (including the 25% contingency) will be ensonified within the 160 dB isopleth for seismic airgun operations and approximately 21,540 km² will be ensonified within the 120 dB isopleth for icebreaking activities on one or more occasions during the planned low-energy seismic survey. The take calculations within the study sites do not explicitly add animals to account for the fact that new animals (i.e., turnover) not accounted for in the initial density snapshot could also approach and enter the area ensonified above 160 dB for seismic airgun operations and 120 dB for icebreaking activities. However, studies suggest that many marine mammals will avoid exposing themselves to sounds at this level, which suggests that there will not necessarily be a large number of new animals entering the area once the seismic survey and icebreaking activities started. Because this

approach for calculating take estimates does not account for turnover in the marine mammal populations in the area during the course of the planned low-energy seismic survey, the actual number of individuals exposed may be underestimated. However, any underestimation is likely offset by the conservative (i.e., probably overestimated) line-kilometer distances (including the 25% contingency) used to calculate the survey area, and the fact the approach assumes that no cetaceans or pinnipeds will move away or toward the tracklines as the Palmer approaches in response to increasing sound levels before the levels reach 160 dB for seismic airgun operations and 120 dB for icebreaking activities, which is likely to occur and which will decrease the density of marine mammals in the survey area. Another way of interpreting the estimates in Table 5 is that they represent the number of individuals that will be expected (in absence of a seismic and icebreaking program) to occur in the waters that will be exposed to greater than or equal to 160 dB (rms) for seismic airgun operations and greater than or equal to 120 dB (rms) for icebreaking activities.

NSF and ASC's estimates of exposures to various sound levels assume that the planned low-energy seismic survey will be carried out in full; however, the ensonified areas calculated using the planned number of line-kilometers has been increased by 25% to accommodate lines that may need to be repeated, equipment testing, etc. As is typical during offshore ship surveys, inclement weather and equipment malfunctions will be likely to cause delays and may limit the number of useful line-kilometers of seismic operations that can be undertaken. The estimates of the numbers of marine mammals potentially exposed to 160 dB (rms) received levels are precautionary and probably overestimate the actual numbers of marine mammals that could be involved. These estimates assume that there will be no weather, equipment, or mitigation delays that limit the seismic operations, which is highly unlikely.

Table 5 shows the estimates of the number of different individual marine mammals anticipated to be exposed to greater than or equal to 120 dB re 1 μ Pa (rms) for icebreaking activities and greater than or equal to 160 dB re 1 μ Pa (rms) for seismic airgun operations during the low-energy seismic survey if no animals moved away from the survey vessel. The total authorized take is given in the column that is fifth from the left) of Table 5.

Encouraging and Coordinating Research

NSF and ASC will coordinate the planned marine mammal monitoring program associated with the low-energy seismic survey with other parties that express interest in this activity and area. NSF and ASC will coordinate with applicable U.S. agencies (e.g., NMFS), and will comply with their requirements. The action will complement fieldwork studying other Antarctic ice shelves, oceanographic studies, and ongoing development of ice sheet and other ocean models. It will facilitate learning at sea and ashore by students, help to fill important spatial and temporal gaps in a lightly sampled region of the Ross Sea, provide additional data on marine mammals present in the Ross Sea study areas, and communicate its findings concerning the chronology and cause of eastern Ross Sea grounding-line translations during the last glacial cycle via reports, publications, and public outreach.

Impact on Availability of Affected Species or Stock for Taking for Subsistence Uses

Section 101(a)(5)(D) of the MMPA also requires NMFS to determine that the taking will not have an unmitigable adverse effect on the availability of marine mammal species or stocks for subsistence use. There are no relevant subsistence uses of marine mammals implicated by this action (in the Ross Sea study area). Therefore, NMFS has determined that the total taking of affected species or stocks will not have an unmitigable adverse impact on the availability of such species or stocks for taking for subsistence purposes.

Analysis and Determinations

Negligible Impact

Negligible impact is “an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival” (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (i.e., population-level effects). An estimate of the number of Level B harassment takes, alone, is not enough information on which to base an impact determination. In addition to considering estimates of the number of marine mammals that might be “taken” through behavioral harassment, NMFS must consider other factors, such as the likely nature of any responses (their intensity, duration, etc.) and the context of any responses (critical reproductive time or location, migration, etc.), as well as the number and nature of estimated Level A harassment takes, the number of estimated mortalities, effects on habitat, and the status of the species.

In making a negligible impact determination, NMFS evaluated factors such as:

- (1) The number of anticipated serious injuries and or mortalities;
- (2) The number and nature of anticipated injuries;
- (3) The number, nature, intensity, and duration of takes by Level B harassment (all of which are relatively limited in this case);
- (4) The context in which the takes occur (e.g., impacts to areas of significance, impacts to local populations, and cumulative impacts when taking into account successive/contemporaneous actions when added to baseline data);
- (5) The status of stock or species of marine mammals (i.e., depleted, not depleted,

decreasing, increasing, stable, impact relative to the size of the population);

(6) Impacts on habitat affecting rates of recruitment/survival; and

(7) The effectiveness of monitoring and mitigation measures.

NMFS has determined that the specified activities associated with the marine seismic survey are not likely to cause PTS, or other, non-auditory injury, serious injury, or death, based on the analysis above and the following factors:

(1) The likelihood that, given sufficient notice through relatively slow ship speed, marine mammals are expected to move away from a noise source that is annoying prior to its becoming potentially injurious;

(2) The availability of alternate areas of similar habitat value for marine mammals to temporarily vacate the survey area during the operation of the airgun(s) to avoid acoustic harassment;

(3) The potential for temporary or permanent hearing impairment is relatively low and would likely be avoided through the implementation of the required monitoring and mitigation measures (including shut-down measures); and

(4) The likelihood that marine mammal detection ability by trained PSOs is high at close proximity to the vessel.

No injuries, serious injuries, or mortalities are anticipated to occur as a result of the NSF and ASC's planned low-energy seismic survey, and none are authorized by NMFS. Table 5 of this document outlines the number of authorized Level B harassment takes that are anticipated as a result of these activities. Due to the nature, degree, and context of Level B (behavioral) harassment anticipated and described in this notice (see "Potential Effects on Marine Mammals" section above), the activity is not expected to impact rates of annual recruitment or survival for

any affected species or stock, particularly given the planned mitigation and monitoring measures to minimize impacts to marine mammals. Additionally, the low-energy seismic survey will not adversely impact marine mammal habitat.

For the marine mammal species that may occur within the action area, there are no known designated or important feeding and/or reproductive areas. Many animals perform vital functions, such as feeding, resting, traveling, and socializing, on a diel cycle (i.e., 24 hr cycle). Behavioral reactions to noise exposure (such as disruption of critical life functions, displacement, or avoidance of important habitat) are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall et al., 2007). While airgun operations are anticipated to occur on consecutive days, the estimated duration of the survey will not last more than a total of approximately 27 operational days. Additionally, the low-energy seismic survey will be increasing sound levels in the marine environment in a relatively small area surrounding the vessel (compared to the range of the animals), which is constantly travelling over distances, so individual animals likely will only be exposed to and harassed by sound for less than a day.

As mentioned previously, NMFS estimates that 18 species of marine mammals under its jurisdiction could be potentially affected by Level B harassment over the course of the IHA. The population estimates for the marine mammal species that may be taken by Level B harassment were provided in Table 2 and 5 of this document. As shown in those tables, the takes all represent small proportions of the overall populations of these marine mammal species (i.e., all are less than or equal to 16%).

Of the 18 marine mammal species under NMFS jurisdiction that may or are known to likely occur in the study area, six are listed as threatened or endangered under the ESA: humpback, sei, fin, blue, and sperm whales. These species are also considered depleted under

the MMPA. None of the other marine mammal species that may be taken are listed as depleted under the MMPA. Of the ESA-listed species, incidental take has been authorized for five species. No incidental take has been authorized for the southern right whale as they are generally not expected in the proposed action area; however, a few animals have been sighted in Antarctic waters in the austral summer. To protect these marine mammals in the study area, NSF and ASC will be required to cease airgun operations if any marine mammal enters designated exclusion zones. No injury, serious injury, or mortality is expected to occur for any of these species, and due to the nature, degree, and context of the Level B harassment anticipated, and the activity is not expected to impact rates of recruitment or survival for any of these species.

NMFS's practice has been to apply the 160 dB re 1 μ Pa (rms) received level threshold for underwater impulse sound levels to determine whether take by Level B harassment occurs. NMFS has determined that, provided that the aforementioned mitigation and monitoring measures are implemented, the impact of conducting a low-energy marine seismic survey in the Ross Sea, January to February 2015, may result, at worst, in a modification in behavior and/or low-level physiological effects (Level B harassment) of certain species of marine mammals.

While behavioral modifications, including temporarily vacating the area during the operation of the airgun(s), may be made by these species to avoid the resultant acoustic disturbance, alternate areas are available for species to move to and the activity's duration is short and sporadic duration. Due to the nature, degree, and context of Level B (behavioral) harassment anticipated and described (see "Potential Effects on Marine Mammals" section above) in this notice, the proposed activity is not expected to impact rates of annual recruitment or survival for any affected species or stock, particularly given the NMFS and applicant's plan to implement mitigation and monitoring measures will minimize impacts to marine mammals.

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the required monitoring and mitigation measures, NMFS finds that the total marine mammal take from NSF and ASC's low-energy seismic survey will have a negligible impact on the affected marine mammal species or stocks.

Small Numbers

As mentioned previously, NMFS estimates that 18 species of marine mammals under its jurisdiction could be potentially affected by Level B harassment over the course of the IHA. The population estimates for the marine mammal species that may be taken by Level B harassment were provided in Tables 2 and 5 of this document.

The estimated numbers of individual cetaceans and pinnipeds that could be exposed to seismic sounds with received levels greater than or equal to 160 dB re 1 μ Pa (rms) during the low-energy seismic survey (including a 25% contingency) and greater than or equal to 120 dB re 1 μ Pa (rms) for icebreaking activities are in Table 5 of this document. Of the cetaceans, 937 humpback, 2,151 Antarctic minke, 2,151 minke, 118 sei, 781 fin, 167 blue, and 252 sperm whales could be taken by Level B harassment during the planned low-energy seismic survey, which will represent 9.88, 11.87, unknown, 0.15, 16.72, 9.82, and 2.65% of the affected worldwide or regional populations, respectively. In addition, 343 Arnoux's beaked, 115 strap-toothed beaked, and 300 southern bottlenose whales could be taken by Level B harassment during the planned low-energy seismic survey, which will represent unknown, unknown, and 0.6% of the affected worldwide or regional populations, respectively. Of the delphinids, 532 killer whales, 1,018 long-finned pilot whales, and 483 hourglass dolphins could be taken by Level B harassment during the planned low-energy seismic survey, which will represent 2.13,

0.51, and 0.34 of the affected worldwide or regional populations, respectively. Of the pinnipeds, 17,288 crabeater, 679 leopard, 425 Ross, 2,713 Weddell, and 4 southern elephant seals could be taken by Level B harassment during the planned low-energy seismic survey, which will represent 0.35, 0.31, 2.13, 0.54, and <0.01 of the affected worldwide or regional population, respectively.

No known current worldwide or regional population estimates are available for 3 species under NMFS's jurisdiction that could potentially be affected by Level B harassment over the course of the IHA. These species include the minke, Arnoux's beaked, and strap-toothed beaked whales. Minke whales occur throughout the North Pacific Ocean and North Atlantic Ocean and the dwarf sub-species occurs in the Southern Hemisphere (Jefferson et al., 2008). Arnoux's beaked whales have a vast circumpolar distribution in the deep, cold waters of the Southern Hemisphere generally southerly from 34° South. Strap-toothed beaked whales are generally found in deep temperate waters (between 35 to 60° South) of the Southern Hemisphere (Jefferson et al., 2008). Based on these distributions and preferences of these species and the relatively small footprint of the low-energy seismic survey compared to these distributions, NMFS concludes that the authorized take of these species likely represent small numbers relative to the affected species' overall population sizes.

NMFS makes its small numbers determination based on the number of marine mammals that will be taken relative to the populations of the affected species or stocks. The authorized take estimates all represent small numbers relative to the affected species or stock size (i.e., all are less than or equal to 16%), with the exception of the three species (i.e., minke, Arnoux's beaked, and strap-toothed beaked whales) for which a qualitative rationale was provided. Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the mitigation and

monitoring measures, NMFS finds that small numbers of marine mammals will be taken relative to the populations of the affected species or stocks. See Table 5 for the authorized take numbers of marine mammals.

Endangered Species Act

Of the species of marine mammals that may occur in the planned survey area, six are listed as endangered under the ESA: the southern right, humpback, sei, fin, blue, and sperm whales. Under section 7 of the ESA, NSF, on behalf of ASC and one other research institution (Louisiana State University), initiated formal consultation with the NMFS, Office of Protected Resources, Endangered Species Act Interagency Cooperation Division, on this low-energy seismic survey. NMFS's Office of Protected Resources, Permits and Conservation Division, initiated and engaged in formal consultation under section 7 of the ESA with NMFS's Office of Protected Resources, Endangered Species Act Interagency Cooperation Division, on the issuance of an IHA under section 101(a)(5)(D) of the MMPA for this activity. These two consultations were consolidated and addressed in a single Biological Opinion addressing the direct and indirect effects of these independent actions. In January 2015, NMFS issued a Biological Opinion that concluded that the action is not likely to jeopardize the continued existence of the six listed cetaceans that may occur in the study area and included an Incidental Take Statement (ITS) incorporating the requirements of the IHA as Terms and Conditions of the ITS. Compliance with those Terms and Conditions is likewise a mandatory requirement of the IHA. The Biological Opinion also concluded that designated critical habitat of these species does not occur in the action area and would not be affected by the low-energy seismic survey.

National Environmental Policy Act

With NSF and ASC's complete IHA application, NSF and ASC provided NMFS an

“Initial Environmental Evaluation/Environmental Assessment to Perform Marine Geophysical Survey, Collect Bathymetric Measurements, and Conduct Sediment Coring by the RVIB Nathaniel B. Palmer in the Ross Sea,” (IEE/EA), prepared by AECOM on behalf of NSF and ASC. The IEE/EA analyzes the direct, indirect, and cumulative environmental impacts of the planned specified activities on marine mammals, including those listed as threatened or endangered under the ESA. NMFS, after independently reviewing and evaluating the document for sufficiency and compliance with Council on Environmental Quality (CEQ) NEPA regulations and NOAA Administrative Order 216-6 § 5.09(d), will conduct a separate NEPA analysis and has prepared an “Environmental Assessment on the Issuance of an Incidental Harassment Authorization to the National Science Foundation and Antarctic Support Contract to Take Marine Mammals by Harassment Incidental to a Low-Energy Marine Geophysical Survey in the Ross Sea, January to April 2015.” NMFS has determined that the issuance of the IHA is not likely to result in significant impacts on the human environment and issued a Finding of No Significant Impact (FONSI).

Authorization

NMFS has issued an IHA to NSF and ASC for conducting a low-energy seismic survey in the Ross Sea, incorporating the previously mentioned mitigation, monitoring, and reporting requirements.

Dated: January 26, 2015.

Donna S. Wieting,
Director,
Office of Protected Resources,
National Marine Fisheries Service.

